

Abstract Submitted
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A cryogenic quantum gas scanning magnetic microscope
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BENJAMIN LEV, Stanford Univ - Ginzton Lab — Improved measurements of
strongly correlated and topologically non-trivial systems open the path to a better
fundamental understanding of these materials as well as the possibility for predictive
design of new materials. We are working to demonstrate atom chip trapping of quan-
tum gases to enable single-shot, large area imaging of electronic transport through
these materials via detection of magnetic flux at the 10^{-7} flux quantum level and
below. Using the exquisite sensitivity of ultracold atoms in the form of either an
atomic clock or Bose-Einstein condensate, the cryogenic atom chip technology we
have recently demonstrated [1] will provide a magnetic flux detection capability that
surpasses other techniques while allowing sample temperatures spanning < 10 K to
room temperature. We will report on experimental progress toward developing this
novel quantum gas scanning magnetic microscope and describe our recent proposal
to image topologically protected transport through a non-ideal topological insulator
in a relatively model-independent fashion.

[1] M. A. Naidés, R. W. Turner, R. A. Lai, J. M. DiSciaccia, and B. L. Lev, Trapping
ultracold gases near cryogenic materials with rapid reconfigurability, *Appl. Phys.*
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